*DOCUMENT SOURCE: The text below contains the DRAFT measures currently under consideration for the new City of Austin Habitat Conservation Plan for the Barton Springs Salamander (*Eurycea sosorum*) to be submitted to the U.S. Fish and Wildlife Service in 2012. These measures are DRAFT and subject to change at any time during the development of the final Habitat Conservation Plan. These measures have NOT been reviewed or approved by U.S. Fish and Wildlife Service staff. The numbers in parenthesis following each measure reflect the number of the measure in the current HCP for reference. For more information on the City of Austin's Endangered Species Act Section 10(a)(1)(B) permit renewal from the U.S. Fish and Wildlife Service, visit our webpage*:
http://www.ci.austin.tx.us/watershed/salamander_guidelines.htm

I. The City of Austin (hereafter the "City") shall responsibly administer this Habitat Conservation Plan (HCP), provide regular reports to the U.S. Fish and Wildlife Service (hereafter the "Service"), and coordinate actions with regional partners.

1. The City will be responsible for compliance with all measures in the HCP. All management measures will be implemented upon issue of the permit unless otherwise stated. (1)
2. The City will be responsible for maintaining scientific information and data on *Eurycea sosorum*, the Barton Springs Salamander, and *Eurycea waterlooensis*, the Austin Blind Salamander. (1)
3. The City will be responsible for the timely transmittal of information and data to the Service. (1)
4. The City will submit an annual report on February 1 of each calendar year, or other agreed to date, to the US Fish and Wildlife Service Austin Ecological Field Services Office, the City Manager and City Council. The annual report will include assessments of the status of the protected salamander species, analysis of biological data, and review of Barton Springs Pool maintenance and management activities during the year. In the annual report, each point of the HCP will be addressed. (1)
5. The term of the permit shall be 20 years (1)
6. The City will participate in regional planning efforts that may affect the Barton Springs Segment of the Edwards Aquifer.
7. The City will develop and adopt a memorandum of understanding with the Barton Springs Edwards Aquifer Conservation District to formalize collaborative efforts to protect the salamander and the Barton Springs Segment of the Edwards Aquifer within one year of permit issue.

II. The City will maintain habitat for *Eurycea sosorum* and *Eurycea waterlooensis* by maintaining or restoring natural ecosystem characteristics, the native aquatic species community, and an ecologically-healthy, native riparian community to the greatest extent feasible.

1. The City will develop written habitat management plans for each spring site within one year of permit issue. These plans will include ongoing activities to improving the quality of aquatic habitat and ecosystem health. This includes but

is not limited to introduction of native aquatic plants and maintenance of adequate tree canopy cover. The City will revise these plans as necessary.

2. The City will be responsible for the management of aquatic and riparian habitats of (reference figure of spring sites):
   a. Barton Springs Pool and Parthenia Spring (fissures, springs, and Beach habitat), (7c)
   b. Eliza Spring (spring pool, outflow pipe and/or stream) ,
   c. Old Mill/Sunken Garden Spring (spring pool and outflow stream),
   d. Upper Barton Spring (spring and outflow streams)
3. The City will continue improvement and maintenance of suitable substrates in salamander habitat. If replacement of rocky substrate of salamander habitat is necessary, the City may use only limestone gravel or cobble in order to maintain the natural groundwater buffering of karst aquifers. (7c)
4. Access to Eliza Spring and Old Mill Spring (Sunken Garden) will be restricted to ensure no unauthorized disturbance of salamander habitat and/or its supporting riparian habitat. Unsupervised access to these sites is limited to individuals holding valid federal 10(a)1(A) and state permits. Recreational access to Barton Springs Pool and Upper Barton Spring will continue to be permitted.(16)
5. The City will make visual inspections of all protected habitat areas (spring sites when flowing) at least four days a week. City of Austin Parks and Recreation Department staff will be present at Barton Springs Pool when it is open and will visually inspect Parthenia Spring. Inspections will note any problem conditions such as vandalism, trash, debris, introduction of exotic fish or animals, or disturbance of habitat. If problems are discovered, staff will take appropriate action to protect salamanders and their habitat. (2)
6. The City will prohibit the following:
   a. unauthorized, deliberate disturbance of salamander habitat, including substrate, aquatic vegetation, algae, and leaf litter or woody material from terrestrial vegetation,
   b. unauthorized, deliberate disturbance or alteration of flow regime (28),
   c. introduction of non-native flora or fauna into any salamander habitat or Barton Springs Pool. (24),
   d. unauthorized SCUBA in salamander habitat or Barton Springs Pool (27).
7. The City will clean salamander habitat as necessary to keep at least the upper 2-3 inches of habitat from becoming embedded with sediment. All salamander habitat will be cleaned with spring water at pressures not to exceed 30 psi at the substrate and/or suspend rocks larger than 4 inches in diameter. Spring water for cleaning may be obtained by recirculation through submersible pumps, or other methods acceptable to the Service. (7b, 23)
8. The City may remove woody debris from aquatic habitat if necessary by any methods approved by the Service through verbal or written correspondence. All debris removed from salamander habitat will be visually inspected for salamanders and their prey before and after removal. Live salamanders will be noted and returned to the water; live prey will be returned to the water as much as is feasible. (21)

9. Sediment, algae, and debris disturbed or collected during routine cleaning of the Pool will not be disposed of in, or allowed to settle in, or otherwise adversely affect aquatic habitat. (29)

III. The City will reduce and mitigate the impacts of entry into Barton Springs Pool and Eliza, Old Mill, and Upper Barton springs of anthropogenic pollutants detrimental to salamanders or their habitat.

1. The City will reduce loadings of petroleum hydrocarbons, heavy metals and sediments to Barton Springs from current development and other activities located within the Barton Springs Zone in areas subject to the City's jurisdiction. This reduction in loadings will be achieved through the measures set out in the City's Stormwater Management Plan as required by the City's Texas Pollutant Discharge Elimination System stormwater permit. (40)
2. Direct stormwater runoff can carry sediment and potential pollutants directly into Barton Springs Pool and adjacent springs, which could adversely affect aquatic life. The City will control local surface water runoff around Barton Springs Pool, Eliza Spring, Old Mill Spring (Sunken Garden), and Upper Barton Spring to the maximum extent practical. Runoff protection improvement projects will not have adverse effects on salamanders or their habitat. These controls do not include stormwater runoff collecting in Barton Creek that causes basin-wide flooding that can inundate the springs. (12)
3. The City will maintain a plan for responding to catastrophic contaminant spills that threaten protected salamanders or their habitat. (36)

IV. The City will change operation and management procedures at Barton Springs Pool to restore and/or maintain as much as is feasible the natural flow regime of a central Texas spring-fed stream/creek system for *Eurycea sosorum* and *Eurycea waterlooensis*. This will help maintain natural and artificial selection on these species favoring adaptive responses to current and future variation in surface water flows and disturbance. The natural flow regime includes variation in water depth, velocity, and turbulence within the channel associated with variation in aquifer discharge, and surface water flood and base flows.

1. The City will maintain a more natural flow regime to the maximum extent feasible by allowing flood water to pass through Barton Springs Pool as unimpeded as is feasible to restore or maintain a more natural disturbance regime, which includes increased water velocities that inhibit excess settling of sediment and debris within the Pool confines. Prior to opening the gates in the downstream dam in preparation for potential flooding, pool staff will confirm with City biologists that Eliza Spring is properly prepared according to the Drawdown Plan
2. The City will develop a plan for routine silt and gravel removal in the deep end of the Pool subject to verbal or written approval of the Service. The plan will describe when and how the removal of material will occur. The plan will be in place within one year of the issuance of this permit. The take estimate may change due to this policy but would be proposed as a minor amendment to the

HCP and receive verbal or written approval by the Service prior to implementation. (35)

3. The City will maintain a Drawdown Plan, which will provide standard operating procedures for use when pool water levels are lowered. This plan will be in place at issuance of permit subject to verbal or written approval by the Service. The Plan will be updated periodically subject to approval by the Service.
4. The City will not conduct a full drawdown of the water level in Barton Springs Pool if Eliza Spring or Beach habitat is expected to go dry or if discharge from the Barton Springs complex is equal to or greater than 54 ft^3/s without Service approval. This measure is intended to prevent rapid dewatering of surface habitat of Eliza Spring and the Beach. Full drawdowns conducted when discharge is equal to or greater than 54 ft^3/s are not expected to cause Eliza Spring to go dry based on current substrate elevation and outflow blockage methods. These conditions may change after restoration of the natural substrate elevation in Eliza Spring. If so, the 54 ft^3/s threshold may be revised subject to verbal or written approval by the Service.
5. Verbal approval from the City biologist is needed before drawdowns of water level in Barton Springs Pool will be conducted.
6. When water level in the Pool is lowered for cleaning and maintenance, trained City staff will visually inspect all exposed habitat for stranded salamanders before cleaning and maintenance activities in those areas begin. Any stranded salamanders will be moved to permanent water. Eliza Spring will be inspected to ensure that water is retained in surface habitat of the spring.
7. A minimum of two City biologists will be present when a full drawdown is conducted and a minimum of one City biologist will be present when a partial drawdown is conducted for cleaning and maintenance
8. The City may conduct 4 full drawdowns per year exclusive of flood events, provided discharge from the Barton Springs complex is equal to or greater than 54 ft^3/s at the time of drawdown. This may be accomplished by pumping water from the springs to the fissures using submersible pumps while staff search for stranded salamanders. The City will maintain water over the fissures during Pool drawdown to provide avenues for salamanders to retreat with receding water and help prevent stranding. After the water level has stabilized and the fissures area has been searched for stranded salamanders, the area may be allowed to dry.
9. The City may conduct 8 partial drawdowns per year at the discretion of City biologists if discharge from the Barton Springs complex is at least 54 ft^3/s and Eliza Spring habitat is not expected to go dry. If the discharge is less than 54 ft^3/s, partial drawdowns will only be conducted with verbal or written approval of the Service. At least 12 inches of water depth over the Beach will be maintained and surface habitat in the adjacent perennial springs (Eliza and Old Mill/Sunken Garden) will not be allowed to go dry. When discharge is greater than or equal to 26 ft^3/s and Eliza Spring habitat is not expected to go dry, the water level in the Pool may be drawn down up to 4 inches monthly to increase water velocity and flush out nuisance algae and sediment.
10. Should a catastrophic spill threaten to extirpate *E. sosorum* in the wild, the City may conduct a full or partial drawdown as necessary to rescue salamanders or

reduce residence time of pollutants within Barton Springs Pool. The City will verbally notify the Service in the event of a catastrophic spill. Staff will search all exposed habitat area for salamanders.

11. In the event of a flash flood or potential flash flood, the lifeguards will prepare the Pool area for flooding to insure that excess debris is not deposited in salamander habitat.

V. The City will restore and/or maintain more natural flow regimes in Barton Springs Pool, Eliza Spring, and Old Mill (Sunken Garden) Spring to the maximum extent feasible by modifying, replacing or removing existing infrastructure. Restoration of free-flowing spring pools and overland streams at Eliza and Old Mill (Sunken Garden) springs will improve and enlarge surface salamander habitat and improve habitat quality. The City will develop plans for these restoration projects with the verbal or written approval of the Service prior to implementing restoration. Flow regime improvements will not compromise water quality during baseflow. (refer to the Water Quality Assessment of Barton Creek from the BSP bypass BA).

1. Eliza Spring flow regime improvement will be implemented to the maximum extent feasible to recreate historical salamander habitat by restoring the surface outflow stream. Presently, the outflow from the spring is routed through an underground pipe into the Barton Springs Pool bypass culvert and ultimately into Barton Creek downstream of Barton Springs Pool; there is no surface stream. The underground pipe is proposed to be “daylighted” and a natural surface stream created in its place. The new stream will be protected salamander habitat and access will be restricted. To fully recreate a free-flowing spring-fed stream system, the natural elevation and composition of the substrate in the spring pool will be restored to the maximum extent feasible. This will eliminate hindrance of aquifer flow to surface habitat, and provide wetted surface habitat during low aquifer discharge conditions and drawdowns without hindering outflow from the spring pool. A natural substrate will also provide abundant avenues for movement to and from subterranean habitat, reducing the potential for stranding salamanders during drawdowns . The current outflow pipe may be repaired as necessary until the stream is restored. All restoration activities will be submitted to the Service and receive verbal or written approval before implementation.
2. Old Mill/Sunken Garden Spring habitat restoration will be implemented to the maximum extent feasible to eliminate permanent, immovable obstructions and hindrances to free outflow from the spring pool to its stream. Infrastructure associated with the plugged outflow pipe on the Tier 1 stone wall (immediately surrounding the spring pool) will be removed. The elevation of the outflow streambed will be lowered to ensure free water flow from the spring pool to its stream. A community of native aquatic vegetation will be established, which will help mitigate effects of low spring discharge by releasing oxygen into the water. Canopy cover vegetation will be maintained or increased to provide shade over the spring pool and stream, which will help mitigate increased surface water temperature during seasonal periods of high air temperature. Remaining stone walls of the amphitheater outside of aquatic salamander habitat and the supporting

riparian habitat (Tiers 2 – 4) may be rehabilitated or stabilized as necessary to ensure safety in publicly accessible areas. Plans will be submitted to the Service and receive verbal or written approval before implementation.

3. The City will restore and permanently maintain groundwater flow and light penetration to the maximum extent feasible in salamander habitat fissures of Parthenia Spring. The City will not artificially obstruct groundwater flow or light penetration in the fissures habitat area. Restoration will include permanent removal of concrete in the natural fissures transmitting groundwater to the surface in Parthenia Spring. Small areas of concrete may be removed gradually using underwater hand tools. Large areas may be removed at one time during drawdown, which would allow use of larger construction tools and foster retreat of salamanders from work area. Removal methods will be chosen to minimize harassment of resident salamanders and subject to verbal or written approval of the Service.

V. The City will protect the evolutionary potential of wild and captive populations of *Eurycea sosorum* and *Eurycea waterlooensis.* This effort will include maintenance and/or enhancement of genetic variation and gene flow among populations of each species, and maintenance of natural selection characteristic of wild environments. Maintenance of evolutionary potential may include artificial selection for adaptations to future environmental conditions in the wild.

1. The City will move salamanders among spring sites or release salamanders born in captivity only according to a Service-approved plan to maintain genetic diversity of the species. The four spring sites do not harbor genetically unique populations based on current genetic information. Transfer of individuals between sites will not adversely affect the genetic integrity of those populations and will maintain the genetic integrity of the species. (25)
2. The City will maintain viable, evolutionarily fit captive breeding populations of *Eurycea sosorum* and *Eurycea waterlooensis*. The City will designate a staff biologist and dedicate a minimum of $28,000 annually to the development and maintenance of this program. The purpose of this program is to provide captive salamanders suitable for reintroduction into the wild if catastrophic events that compromise or cause extirpation of wild populations were to occur. This program can also contribute to elucidation of biology, life history, and natural history of both species. The City will maintain written population management plans, reintroduction plans, and a husbandry manual for this program, which will be updated bi-yearly. (41)

VII. The City will adopt benign cleaning practices for the maintenance of Barton Springs Pool to reduce the harassment and/or harm of *Eurycea sosorum* and *Eurycea waterlooensis*.

1. The City may manually trim aquatic vegetation (macrophytes, bryophytes, and algae) as necessary. Vegetation management will not adversely affect habitat or compromise ecosystem health. Only City biologists listed under current federal

10(a)1(A) and state permits are authorized to manage vegetation in salamander habitat areas. (26)

2. Specific areas will be designated for the fueling and maintenance of equipment and vehicles used in maintaining the springs and surrounding areas. Fueling and maintenance areas will be at least 25 feet away from the water to avoid the chance of detrimental impacts on the spring habitats or aquatic life. Absorbent pads will be used underneath or around all equipment, supplies, and vehicles containing toxic components during all operations, fueling, and maintenance activities. (34)
3. The City will clean the shallow end of Barton Springs Pool without full drawdown of water level in the entire Pool. Adjustable gates in dams or similar water control devices may be used to conduct partial drawdowns that expose only the shallow end for cleaning. (6)
4. The City will use spring water for all cleaning in Barton Springs Pool. The City will install an electrically powered pump system that provides spring water from Barton Springs Pool for cleaning of the Pool. The pump system may also be used to provide spring water for the fissures areas during Pool drawdown. (5)
5. The City will prohibit cleaning of the pool by chemical means.

VIII. The City will continue to obtain and manage data on *Eurycea sosorum* and *Eurycea waterlooensis* and their habitats. These data and other pertinent information will be shared with the Service, Texas Parks and Wildlife, City employees working within salamander habitat, the scientific community, and the general public.

1. The City will conduct salamander surveys at perennial Parthenia, Eliza, and Old Mill (Sunken Garden) springs, and at intermittent Upper Barton Spring while flowing on a regular basis throughout the year sufficient to determine the status of the species and track population dynamics as determined appropriate by a City biologist. The City will ensure that all people surveying for salamanders are properly trained. Surveys can include methods to elucidate life history characteristics of both species. Methods will be evaluated by the Service and conducted under the terms and conditions of a valid federal 10(a)1(A) permit issued to the City. (38)
2. The City will continue to provide educational programs to enhance public awareness and community support for *Eurycea sosorum*, *Eurycea waterlooensis*, and the Edwards Aquifer. The SPLASH! Into the Edwards Aquifer exhibit at Barton Springs Pool will continue to be a major focus of this effort. The City of Austin Parks and Recreation Department will dedicate a minimum of $10,000 annually from the revenues generated by Barton Springs Pool to the development and maintenance of this exhibit. The City of Austin Watershed Protection Department will make available $35,000 annually for the creation and maintenance of educational materials at the SPLASH! Exhibit. Outdoor educational displays will emphasize the biology and ecology of Barton Springs with an emphasis on *Eurycea sosorum* and *Eurycea waterlooensis*. (17)
3. Eliza Spring and Old Mill Spring (Sunken Garden) will be used as outdoor educational facilities for the study of the biology and ecology of Central Texas springs.(16)

4. The City will ensure that Barton Springs Pool lifeguards and maintenance staff, including seasonal employees, are knowledgeable about the salamander. At a minimum, staff will be will be trained yearly about the protected salamanders, resident aquatic wildlife and flora, and the ecology of Edwards Aquifer springs. Training will include contaminant spill and response protocols, proper containment techniques, and remediation. An inventory of necessary containment and remediation equipment will be conducted by Pool staff annually and after the use of equipment in response to any spill. City of Austin Parks and Recreation Department Aquatics supervisors will direct and document all cleaning procedures at the Pool. (30, 31, 33)
5. The City will ensure that all people conducting salamander and water quality monitoring are properly trained. All monitoring and surveys will be conducted under the terms and conditions of a current federal 10(a)1(A) permit issued to the City of Austin. (32)
6. The City of Austin will set up a fund for conservation and research efforts for *Eurycea sosorum* and *E. waterlooensis*. The City will deposit $53,000 annually (for the term of the permit) into this fund from the revenues generated by Barton Springs Pool. This fund will also be open to donations from any group or private individual. A committee of technical representatives will decide the allocation of money from this fund. At a minimum, the committee will consist of one technical representative from the City and one technical representative from the Service. These technical representatives must be knowledgeable and experienced in salamander biology. Other committee members could include State, County, University or other qualified biologists and karst aquifer hydrogeologists, and swimmer/stakeholder representatives. The City and the Service would both retain "veto" power in deciding how the money is allocated. The funds would be used for study of salamander biology, captive breeding, refugia development, reintroduction, watershed related research, improved cleaning techniques for natural water bodies, education, and/or land acquisition. (18)
7. The City of Austin will form the Barton Springs Scientific Advisory Committee, which will include local and regional experts. The committee may be divided into subcommittees that focus on specific areas of expertise and will meet at least annually to discuss and refine Barton Springs' maintenance and environmental management activities. A variety of interests including swimming, biology, hydrogeology, and captive breeding may be represented on this committee. In addition, this committee will review this Habitat Conservation Plan (HCP) and make suggestions for needed amendments as deemed necessary. The Advisory Committee will also be responsible for helping identify potential revisions to the HCP and suggest adaptive management strategies. The City will be responsible for implementation of adaptive management strategies. (39)